



Towards a renewable future in the bioeconomy

Karl-Henrik Sundström

CEO Stora Enso



**Between 2005 and 2015,
European forests grew by an
area the size of Switzerland -
that's 1 500 football pitches
every day!**

The renewable materials growth company



Everything that's made with fossil-based materials today can be made from a tree tomorrow



Our road to success in the bioeconomy...

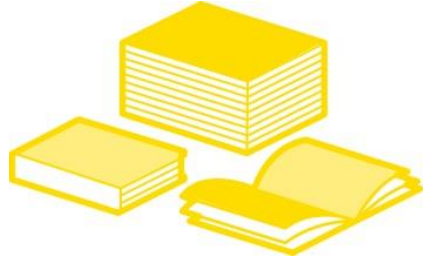
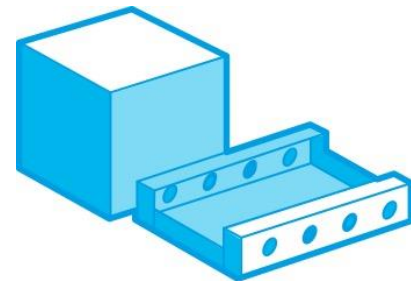


Introducing
new products
and services

Addressing
attractive
end-use
segments




Delivering
sustainable
profitable
growth

Generating
superior
ROCE



...and we are continuously developing



	PRODUCT / TECHNOLOGY	CUSTOMER USE EXAMPLES	R&D	PILOTING	SCALING	FULLY ADOPTED BY MARKETS
1. BIO-CHEMICALS – INDUSTRIAL INTERMEDIATES 	Lignin	▪ Replace phenol			●	
	Xylose	▪ Sweetener, personal care		●		
	Biomass polymers	▪ Replace oil-based plastic	●			
	Dissolving pulp	▪ Textiles, packaging		●		
	Modified fibres	▪ Performance chemicals ▪ Personal care ingredients	● ●			
2. REPLACING FOSSIL MATERIALS IN PRODUCTS 	Micro-fibrillated cellulose	▪ Bio-barrier in food cartons ▪ Lightweight board ▪ Strengthening liner		●		
	Biocomposites	▪ Building & construction		●		
	Lignin bio-carbon fibre	▪ Lightweight structures, energy storage, transportation			●	
	Building systems Modified wood	▪ High rise buildings ▪ Cladding, decking			●	●
3. ENABLING INNOVATIONS OF NEW CONSUMER EXPERIENCES 	Nano cellulose	▪ Transparent / Electronic ▪ Programmable / Foam / Spheres	●			
	Digitalisation	▪ Material with in-built monitoring and tracking capabilities for intelligent packaging		●	●	

Our drivers for accelerating renewable growth



In 2017, over **7%**
of our sales came from
NEW products and
services

Developing new technologies for using wood fibre



Regenerated cellulose

Development of new technologies for using wood fibre in textile



Micro-fibrillated cellulose

MFC is a versatile material with potential to work as

- strength enhancer
- binder
- barrier material

Lignin – big opportunities in many markets



Phenol replacement

- The carbon footprint for lignin is roughly 1/10 of the carbon footprint of phenol
- Key applications: phenol in adhesives for wood construction materials



Carbon fibre

- Light-weight high performance composites
- Key applications: automotive, wind turbines, sports and leisure products



Energy storage

- Substitution of conventional hard carbon anode materials in energy storage, namely Li-Ion Batteries and Supercapacitors
- Key applications: portable consumer electronics, power tools, electrical vehicles, stationary applications and back-up systems

Sugars from wood – Bio-based chemicals replacing fossil-based materials



Bioplastics and intermediates

- Renewable solutions for packaging and bottling
- Reduction on carbon footprint and enhanced properties



Xylose

- Xylitol sweetener

We invest further in CLT



- New production unit for cross laminated timber (CLT) in Sweden
- 45 MEUR investment
- Capacity of 100 000 m³ after ramp-up
- The construction started by the end of Q4 2017
- The production is scheduled to begin during the first quarter of 2019



The investment is subject to receipt of final regulatory permits and approvals.

We invest to grow in renewable materials

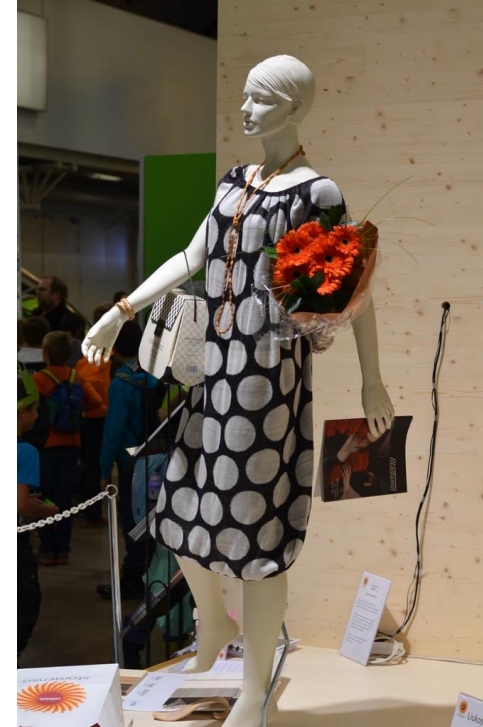


Enocell mill

- EUR 52 million investment to dissolving pulp production capacity increase by 280 000 tonnes
- 430 000 tonnes total dissolving capacity
- Expected to be completed during second half of 2019

Imatra mill

- EUR 42 million investment to increase CTMP drying capacity
- The objective is to improve the CTMP availability at Imatra mills to further enable the commercialisation of MFC
- Expected to be completed during first half of 2019



We invest in further commercialization of microfibrillated cellulose



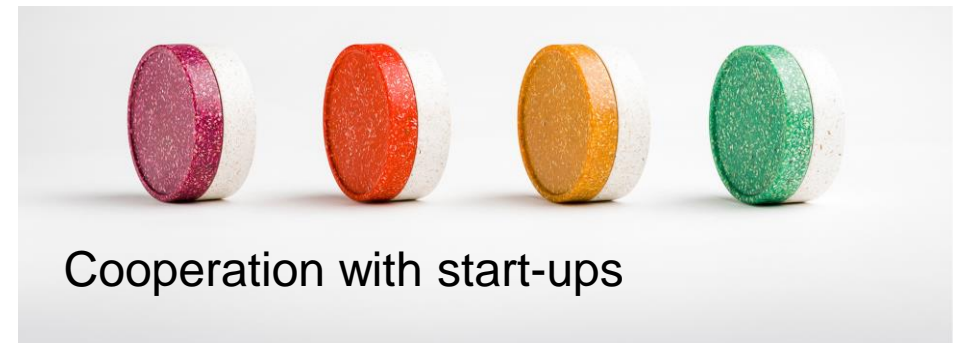
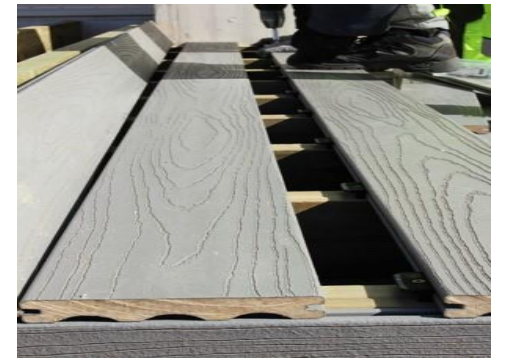
- We are investing a total of EUR 9.1 million into our consumer board mills in Imatra and Ingeröis, Finland, and Fors, Sweden
- MFC is designed to outperform current fossil-based materials
- We will accelerate the product development of new MFC applications
- In the future, MFC has the potential to be used in a variety of entirely new products, including many outside of our current portfolio



We invest in innovative and sustainable alternative to plastics



- **Biocomposite granules** are a mix of wood fibres, polymers and additives
- Raw material for markets where plastics dominate
- Good durability and easy maintenance
- Renewable wood can substitute a large portion of fossil-based materials
- Production scheduled to begin during Q1 2018 in Hylte, Sweden



We take additional steps in digital and intelligent packaging



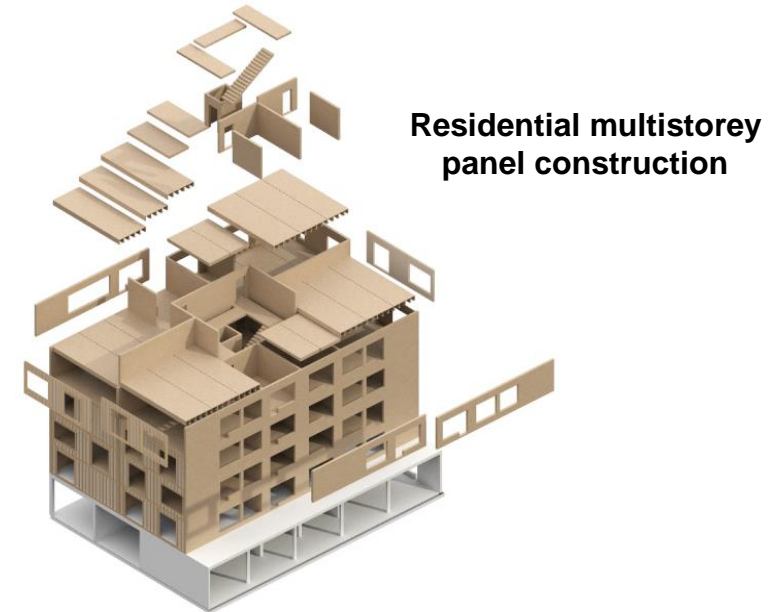
- Creates extra value to the consumer - experience & functionality
- Controls that the product is authentic and provides e.g. information on usability



Building Systems by Stora Enso drive growth



- Instructions for how to build wooden buildings
- Different systems for different building types
- Country specific details and cost analyses
- Open for anyone to access and use



Building components





International House Sydney, Australia 2016-17

Photo: Lendlease

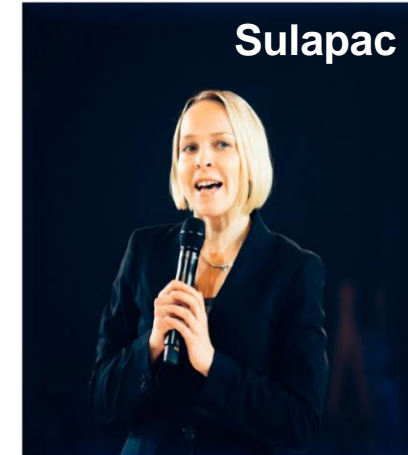
Innovation never happens in isolation - Stora Enso Accelerator program



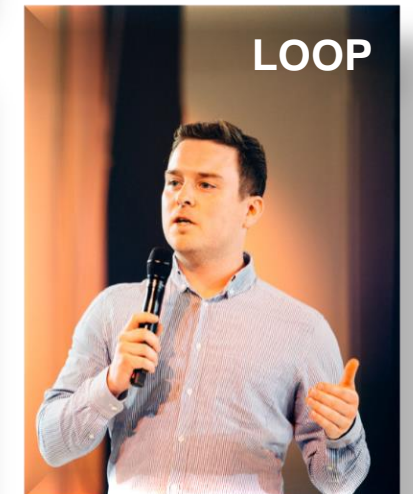
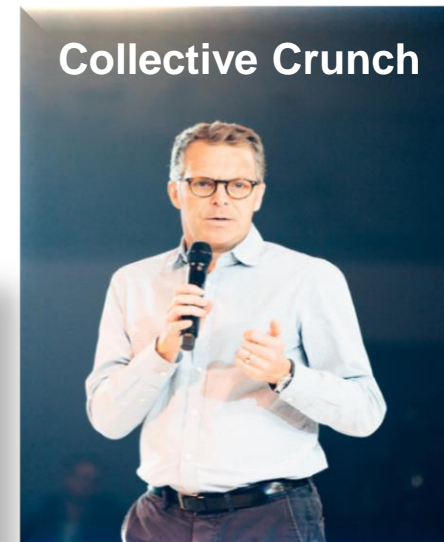
1 Executive program to develop understanding and knowledge within our strategic competencies

2 Doing, living, and acting entrepreneurship side-by-side with real startups

3 Co-development with start-ups of solutions in the area of digitalization



Collective Crunch



Top Data Science



Trä Kronor



Stora Enso research relations in Sweden



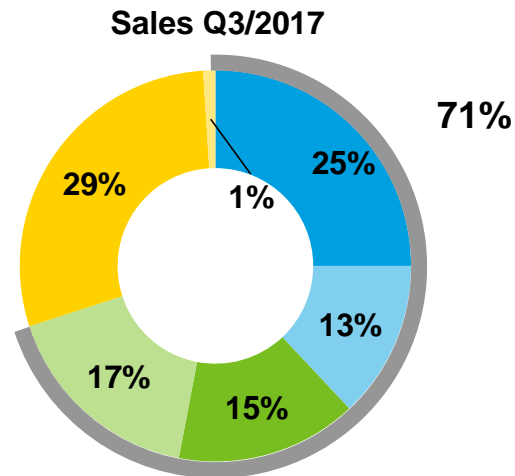
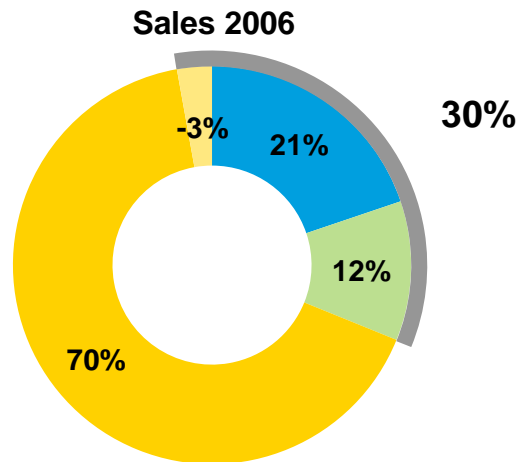
Education, Research & Competence building	Applied research partners & excellence centres	Commercialization partnerships
KTH Chalmers Linköpings universitet Treeseach Wallenberg Wood Science Center Wallenberg Autonomous Systems and Software program Other universities: Mittuniversitetet, Karlstad universitet	Umeå Plant Science Centre SweTree Technologies RISE SLU & Skogforsk MaxIV	Cellutech AB Combient AB Amexci AB



“It is not the strongest of the species that survives but the most adaptable”



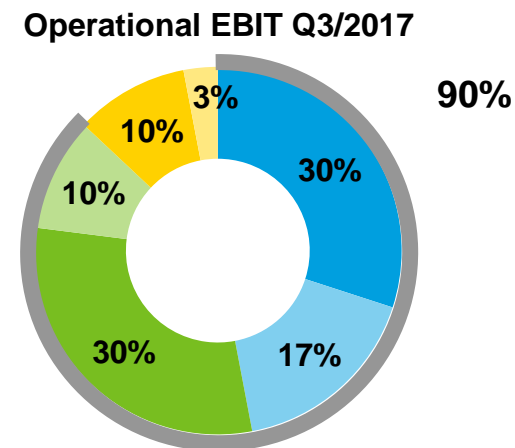
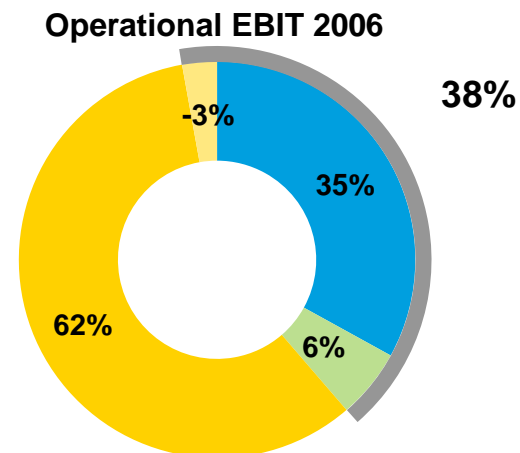
Growth businesses 71% of sales and 90% of operational EBIT



- Consumer Board
- Packaging Solutions¹
- Biomaterials
- Wood Products
- Paper²
- Other & eliminations

¹ In 2006 included in Consumer Board

² In 2006 includes merchants



Bio-economy and Brussels

Brexit, change of political leaders and the future of EU is high on the agenda but still room for the bio-economy

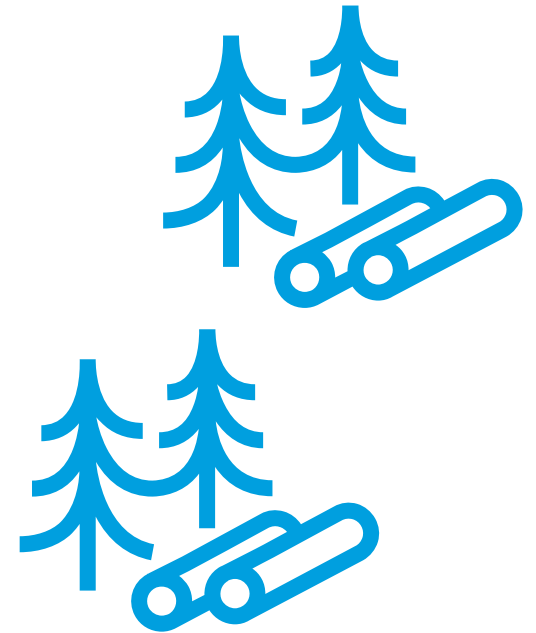


Keep on reminding Brussels that the forest based bio-economy is part of the solution

- Highly relevant for the climate change (LULUCF) and the challenges with plastics (an EU plastics strategy to be presented in January).
- 2018 a revised EUs Bio-economy strategy is expected from the Commission.

Be present and active because the door is not wide open

- A rather intense debate on sustainability and forestry continues
- Ongoing political discussions relevant to the Bio-economy in almost all policy areas (Energy, R&D, Environment, Climate, Trade etc).





**1% shift
of fossil-
based and
other
materials = Over 25
BEUR
renewable
business**

**“Om man vägrar att
se bakåt och inte
vågar se framåt, så
måste man se upp”**

Tage Danielsson

THE RENEWABLE MATERIALS COMPANY



storaenso